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During the first two years of this period ten research projects were supported and during the final year nine units were supported under this program. The units are in the areas of Solid State Electronics, Optical and Infrared Electronics, and Information Electronics. The three year period has been a very productive one from the scientific results achieved and the transfer of the results to industry and government laboratories. The results are documented in the 63 scientific publications and one book chapter that have resulted from this research. Perhaps the best mode of technology transfer is through students who graduate and carry the technology with them to other laboratories and industry. Fourteen students who were supported by JSEP received Ph.D. degrees during this period.

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**JOINT SERVICES ELECTRONICS PROGRAM
RESEARCH IN ELECTRONICS**

CONTRACT NO. F49620-94-C-0022

FINAL REPORT

4/1/94 through 3/31/97

Presented to:

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Presented by:

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Electronic Sciences Laboratory
LOS ANGELES, CALIFORNIA 90089-0483**

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Joint Services Electronics Program

OVERVIEW

This final report on the Joint Services Electronics Program, Contract F49620-94-C-002, covers the three year period 4/1/94 through 3/31/97.

During the first two years of this period ten research projects were supported and during the final year nine units were supported under this program. The units are in the areas of Solid State Electronics, Optical and Infrared Electronics, and Information Electronics. The three year period has been a very productive one from the scientific results achieved and the transfer of the results to industry and government laboratories. The results are documented in the 63 scientific publications and one book chapter that have resulted from this research. Perhaps the best mode of technology transfer is through students who graduate and carry the technology with them to other laboratories and industry. Fourteen students who were supported by JSEP received Ph.D. degrees during this period.

Solid State Electronics

SS2-1 P. D. Dapkus

**Low Temperature H-Free Growth of AlGaInN
Materials by Vacuum Atomic Layer Epitaxy**

SS2-2 A. Madhukar

**Innovative Approaches For Processing of Advanced
Semiconductor Structures and Integration of
Diffractive Optical Elements for Packaging**

SS2-3 R. Nottenburg

High Speed Interface Electronics for Optoelectronics

Optical and Infrared Electronics

OE2-1 J. Feinberg

**Waveguides and Frequency Doubling in Ferroelectric
Crystals**

OE2-2 E. Garmire

**Understanding the Dynamics of Charge Transport in
Quantum Well Structures for Improved Device
Performance**

OE2-3 W. Steier

Integrated Organic Semiconductor Opto-Electronics

OE2-4 A. Levi

**Influence of Reduced Size on the Performance of
Semiconductor Micro-Lasers**

OE2-5 A. Sawchuk

**Integration of Diffractive Optics with Smart Pixels for
Optical Communications, Networking and Computing**

Information Electronics

IE2-1 R. Scholtz

**Wideband Time-Hopping for Multiple-Access
Communications**

IE2-2 A. Polydoros

Inference and Sorting of Wideband Signals

DEGREES AWARDED

Aydin, Levent	PhD	1996
Panagiotou, Prokopias	PhD	1997
Kalburge, Amol	PhD	1997
Konkor, Atul	PhD	1997
Kunzia, Charles	PhD	1994
Lin, Jeng-Feng	PhD	1996
De La Cruz, San Ching	PhD	1997
Noraev, Dmitry	PhD	1996
Kalluri, Shrinath	PhD	1997
Ranon, Peter	PhD	1993
Kanjamala, Ashok	PhD	1997
Thiyagarajan, S.	PhD	1997
Win, Moe	PhD	1997
Lao, Lihui	MS	1996

JOINT SERVICES ELECTRONICS PROGRAM

PUBLICATIONS

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2. "Hop Timing Estimation for Noncoherent Frequency-Hopped MFSK Intercept Receivers," M. K. Simon, U. Cheng, L. Aydin, B. K. Levitt and A. Polydoros, IEEE Trans. on Comm., vol. 44, no. 4, pp. 516-526, April 1996.
3. "Metalorganic Chemical Vapor Deposition" P. D. Dapkus : Heterostructures and Quantum Devices , N. G. Einspruch and W. G. Frensley, eds., Academic Press, San Diego, pp 64-108, 1994
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6. "Parallel Architectures for Digital Optical Cellular Image Processing, " K.-S. Huang, C. B. Kuznia, B. K. Jenkins, and A. A. Sawchuk, Proc. IEEE, vol. 82, pp. 1711-1723, (1994), (invited paper).
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14. "Transferred-electron induced current instabilities in heterojunction bipolar transistors", V. A. Posse, B. Jalali, and A. F. J. Levi, Appl. Phys. Lett. vol. 66, pp. 3319-3321 (1995).
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28. "Electro-optic Polymer Waveguide Devices - Materials, Fabrication, and Applications", William H. Steier, *Invited Paper, OSA Organic Thin Films for Photonics Applications*, Portland, OR, September, 1995.
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46. "Comparisons of Analog and Digital Impulse Radio for Wireless Multiple Access Communications," M. Z. Win and R. A. Scholtz, accepted 1997 International Conference on Communications.
47. "Characterization of Ultra-Wide Bandwidth (UWB) Wireless Indoor Propagation Channels," M. Z. Win, R. A. Scholtz, and M. A. Barnes, accepted 1997 International Conference on Communications.
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53. "Optimized Cellular Interconnects for Optoelectronic Single Instruction Multiple Data Arrays," B. Hoanca and A.A. Sawchuk, submitted to Applied Optics.
54. "Improved Design Method for Diffractive Optical Elements," C.-H. Chen and A.A. Sawchuk, submitted to Applied Optics.
56. "Considerations for Optoelectronic Shared Cache Parallel Computers," L. Cheng and A.A. Sawchuk, Proc. of First International Workshop on Massively Parallel Processing Using Optical Interconnections (MPPOI '94), April 26-27, 1994, IEEE Computer Society Press, Los Alamitos, CA.
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62. "FET-SEED Smart Pixels for Networks and Computing Systems," J.-F. Lin and A.A. Sawchuk, Optical Society of America Annual Meeting, Dallas, October 1994; OSA Annual Meeting Technical Digest 1994, OSA Technical Digest Series (Optical Society of America, Washington, DC, 1994), p. 87.
63. "Smart Pixel Devices for Image Processing and Network Applications," C.B. Kuznia, J.-M. Wu, C.-H. Chen, B. Hoanca and A.A. Sawchuk, Optical Society of America Annual Meeting, Rochester, NY, October 1996; OSA Annual Meeting Program 1996, OSA Technical Digest Series Optical Society of America, Washington, DC, 1996, pp. 112.

Book Chapters.

1. "Nonequilibrium electron transport in heterojunction bipolar transistors," A. F. J. Levi, InP HBTs: Growth, Processing and Applications, eds. B. Jalali and S. J. Pearton, ISBN#0-89006-724-4 (Artech House, Norwood, MA, pp. 89-131, 1995).